Alg. 2 Warm Up #13-2

Solve algebraically:

1. $2|5x - 1| = 6$

2. $4\sqrt{5x - 1} + 6 = 34$

3. $\dfrac{8}{x} + \dfrac{5}{2x} = \dfrac{3x}{2}$

4. $2(1 - 5x) \geq 512$

HW Questions:

4-7. Solve $(x-2)^2 - 3 = 1$ graphically. That is, graph $y = (x-2)^2 - 3$ and $y = 1$ on the same set of axes and find the x-value(s) of any points of intersection. Then use algebraic strategies to solve the equation and verify that your graphical solutions are correct.

$x = 0, 4$

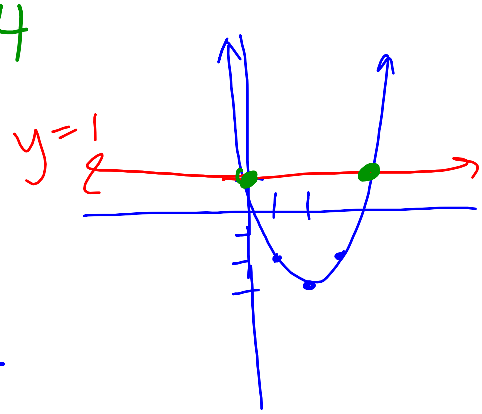
$(x-2)^2 - 3 = 1$

$\sqrt{(x-2)^2} = \sqrt{4}$

$x - 2 = \pm 2$

$+2 \qquad +2$

$x = 0, 4$



4-8. Solve each equation below. Think about Rewriting, Looking Inside, or Undoing to simplify the process.

a. $2(x-1)^2+7=39$

b. $7(\sqrt{m+1}-3)=21$

c. $\frac{6}{1}\left(\frac{x}{2}+\frac{x}{3}\right)=\frac{5x+2}{\cancel{6}}\cdot\frac{\cancel{6}}{1}$

d. $-7+(\frac{4x+2}{2})=8$

$3x+2x=5x+2$

$5x=5x+2$

$-5x \quad -5x$

$0 \neq 2$

No Solution

4-9. Find the equation of the line that passes through $(0, 2)$ and $(5, 2)$. Then complete parts (a) and (b) below.

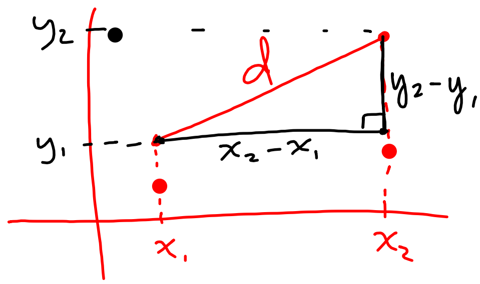
a. What is the equation of the x-axis?

b. What is the equation of the y-axis?

4-11. Classify the triangle with vertices $A(3, 2)$, $B(-2, 0)$, and $C(-1, 4)$ by finding the length of each side. Be sure to consider all possible triangle types. Include sufficient evidence to support your conclusion.

Scalene $\rightarrow$ no $\cong$ sides
Isosceles $\rightarrow$ 2 $\cong$ sides
Equilateral $\rightarrow$ 3 $\cong$ sides

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

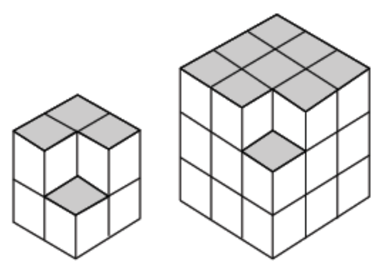


4-12. Examine the figures at right, and then visualize the figure for $n = 4$.

a. How many cubes are in the figure for $n = 4$?

b. How many cubes are in the figure for $n = 1$?

c. Find the general equation for the number of cubes for any n. Verify your formula with the cases of $n = 1$ and $n = 5$.



$n = 2$ $n = 3$

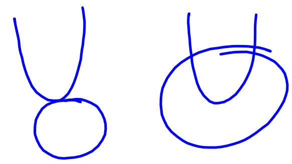
d. Is the sequence arithmetic, geometric, or neither? Explain your reasoning.

4-14. The graph of a line and an exponential can intersect twice, once, or not at all. Describe the possible number of intersections for each of the following pairs of graphs. Your solution to each part should include all of the possibilities and a quickly sketched example of each one.

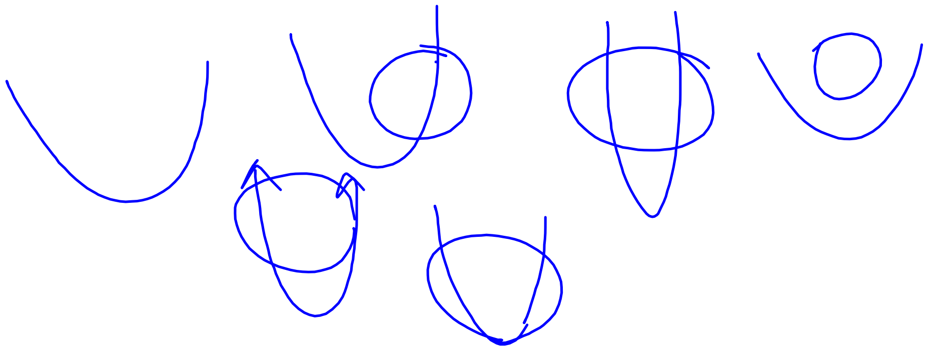
a. A line and a parabola

b. Two different parabolas

c. A parabola and a circle



d. A parabola and the hyperbola $y = \frac{1}{x}$



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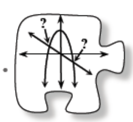
4.1.2 How can I use a graph to solve?

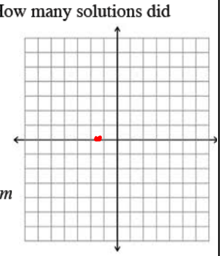


Solving Equations and Systems Graphically

In the previous lesson, you used and named three algebraic methods to solve different kinds of equations. In today's lesson, you will again solve equations, but this time you will use your understanding of graphs, as well as your algebra skills, to solve the equations and to verify your results.

4-15. In problem 4-1, you used a graph to solve an equation. In what other ways can a graph be a useful solution tool? Consider this question as you solve the equation $\sqrt{2x+3} = x$ by completing parts (a) through (d) below.

a. Use algebraic strategies to solve $\sqrt{2x+3} = x$. How many solutions did you find? Which strategies did you use?



$2x+3=0$
$x=-\frac{3}{2}$
$2x+3=1$
$x=-1$

b. In thinking about $\sqrt{2x+3} = x$, Miranda wrote down $y = \sqrt{2x+3}$ and $y = x$. How many solutions does $y = \sqrt{2x+3}$ have? How many solutions does $y = x$ have?

c. Miranda said, "*I'll graph both the functions* $y = \sqrt{2x+3}$ *and* $y = x$ *to check the solutions from part (a).*" How will graphing help her find the solution?

d. Miranda looked at the graph on her graphing calculator and said "*I think something is wrong.*" What happened? Graph the system on your graphing calculator and find the intersection(s) of the functions. How many solutions does this equation have?

15 a) $\left(\sqrt{2x+3}\right)^2 = x^2$

$2x + 3 = x^2$

$0 = x^2 - 2x - 3$

$0 = (x-3)(x+1)$

$\boxed{x = 3, -1}$

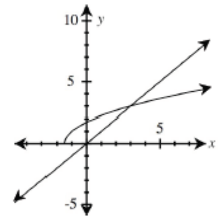
4-16. When a result from an equation-solving process does not make the original equation true, it is called an **extraneous solution**. It is not a solution of the equation, even though it is a result when solving algebraically.

Check your two solutions from part (a) of problem 4-15 algebraically.

check
$x = 3$

check $x = -1$

4-17. The fact that extraneous solutions can arise after following straightforward solving techniques makes it especially important to check your solutions!



But why did the extraneous solution appear in this problem? Examine the graph of the system of equations $y=\sqrt{2x+3}$ and $y=x$, shown at right. Where would an extraneous solution $x=-1$ appear on the graph? Why do the graphs not intersect at that point? Explain.

4-18. After solving the equation $2x^2+5x-3=x^2+4x+3$, Gustav got called to the office and left his team. When his teammates examined his graphing calculator to try to find out how he found his solution, they only saw the graph of $y=x^2+x-6$. Consider this situation as you answer the questions below.

a. How many solutions do you predict $2x^2+5x-3=x^2+4x+3$ will have?

b. Solve $2x^2+5x-3=x^2+4x+3$ algebraically.

c. Where did Gustav get the equation $y=x^2+x-6$? How many solutions will $y=x^2+x-6$ have?

d. How can you see the solutions to $2x^2+5x-3=x^2+4x+3$ in the graph of $y=x^2+x-6$? Explain why this makes sense.

e. Maiya solved $2x^2+5x-3=x^2+4x+3$ by graphing a system of equations and looking for the points of intersection. What equations do you think she used? Graph these equations on your graphing calculator and explain where the solutions to the equation exist on the graph.

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